New Approaches to Arrhythmia Detection and Treatment

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The official link for this solicitation is: http://grants.nih.gov/grants/guide/pa-files/PA-10-118.html

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Description:

The purpose of this initiative is to improve our ability to detect, prevent, and treat all forms of cardiac arrhythmias. This initiative will encourage small business firms to develop improved diagnostic and therapeutic tools, products, or devices for cardiac arrhythmia monitoring, detection and treatment.

Background

Cardiac arrhythmias represent a major source of public health burden and contribute substantially to morbidity and mortality. For example, atrial fibrillation (AF), the most common sustained cardiac arrhythmia, affects nearly 4% of the US population over 60 years of age and is associated with significantly higher risks of stroke and heart failure. Similarly, ventricular arrhythmias which often result in sudden cardiac arrest and death (SCD) are thought to account for more than 350,000 deaths every year in the US, with an estimated 95% of the victims of out-of-hospital SCD succumbing to death before reaching the hospital.

Although all arrhythmias have in common an abnormal electrical activity in the heart, their causes vary greatly and our understanding of the cellular and molecular signaling pathways and anatomic substrate involved in arrhythmogenesis remains incomplete. There are numerous genetic, environmental, pharmacological, biological, and pathophysiological factors that contribute to arrhythmias. In addition, lethal ventricular arrhythmias may occur without warning or prior

indication of heart disease and arrhythmias such as atrial fibrillation may confer risk to patients even when asymptomatic.

NHLBI recently convened two expert panel Working Groups to identify current challenges and future research opportunities in arrhythmia prevention and treatment. Based on the discussions of recent research advances and emerging technologies, the expert panels recommended several broad areas of research and development opportunities for arrhythmia diagnostics and therapeutics. These include: development of better screening assays for disease risk assessment or therapy guidance based on new and emerging discoveries and mechanistic insights (e.g., new gene mutations or polymorphisms, proteomic and/or metabolomic biomarkers, etc.); improvement and optimization of arrhythmia detection algorithms and analyses to improve current device therapies such as pacemakers, implantable cardioverter defibrillators (ICDs) and cardiac resynchronization devices; development of more effective ablation therapies; and development of noninvasive arrhythmia detection tools such as detection and location of arrhythmia susceptible tissue substrates by anatomical imaging or cardiac tissue conductance mapping approaches. Further information on the Working Group recommendations can be accessed at (http://www.nhlbi.nih.gov/meetings/workshops/modifiers.htm; http://www.nhlbi.nih.gov/meetings/workshops/prevent-af.htm).

This initiative will use the NIH SBIR/STTR research funding mechanism, a two phased research and development (R&D) program aimed at fostering the development of clinically relevant technologies and products such as medical devices and implants, pharmaceuticals, biologics, informatics and biotechnologies. It is designed to encourage interested small business firms to actively seek recent technological or scientific breakthroughs from which to develop new diagnostic and therapeutic tools, devices or products aimed at improved detection, treatment and prevention of all forms of cardiac arrhythmias.

Objectives and scope

The goal of this FOA is to develop innovative methods, tools, technologies and approaches to improve our ability to detect, prevent, and treat arrhythmias.

Examples of research topics might include, but are not limited to the following:

- Development of improved diagnostic or therapy-monitoring assays; for example, assays based on markers/genes/identifiers that provide a high level of sensitivity and specificity in identifying patients susceptible to arrhythmias to permit more effective interventions.
- Development of improved cardiac rhythm management and monitoring approaches, including, for example, the development of new data-analysis algorithms and better signal discrimination through improved signal-to-noise ratio.
- Development of noninvasive imaging methods/technologies to detect early arrhythmia progression, such as delayed enhancement MR detection of atrial and ventricular fibrosis and/or improved electro-anatomic conductance mapping.
- Catheter delivery and guidance systems for arrhythmia therapies
- Improved catheter-based ablation devices, including both thermal (e.g., radio-frequency) or cryogenic-based ablation methods.
- Patient-friendly cardiac ECG monitoring systems for the detection of asymptomatic atrial fibrillation.
- Development of surface voltage mapping methods to define location of cardiac conduction defects non invasively.
- Optimization of ICD algorithms aimed at better discrimination of arrhythmias to avoid inappropriate ICD discharge.
- Measurement tools for assessing or comparing the safety and efficacy of arrhythmia therapies.
- Computer models of the human heart for testing arrhythmia therapies.